

**Recovery Outline For
Florida Bristle Fern (*Trichomanes punctatum* ssp. *floridanum*)
June 2018**



Photo courtesy of Jose Luis Perez Calo

I. INTRODUCTION

This document outlines a preliminary course of action for the recovery of the Florida bristle fern until a comprehensive recovery plan for the subspecies is approved. The Florida bristle Fern is a small, cryptic, mat-forming fern. The Florida bristle fern was listed as an endangered species on October 6, 2015 (80 FR 60440). This fern is known to occur only in two, disjunct metapopulations: one in south Florida consisting of four populations and one in central Florida with two populations. The primary threats to the subspecies include extreme curtailment of its habitat (south Florida metapopulation); habitat destruction, conversion, and fragmentation; destruction or damage to plants from foot traffic and recreational vehicles; invasive species; stochastic events; sea level rise; climatic shifts in seasonal precipitation, temperature, and storm cycles.

Listing and Contact Information:

Listing Classification:	Endangered range-wide
Effective Listing Date:	October 6, 2015
Lead Agency, Region:	U.S. Fish and Wildlife Service, Southeast Region
Lead Field Office:	South Florida Ecological Services Field Office
Lead Biologist:	Layne Bolen, 772-469-4332, layne_bolen@fws.gov.

II. RECOVERY STATUS ASSESSMENT

A. BIOLOGY, LIFE HISTORY, HABITAT, AND THREATS ASSESSMENT

[Note: For a more detailed description of this species' biology, life history, distribution, habitat, and an assessment of the listing factors as they relate to the Florida bristle fern, please see the final listing rule (10/6/2015; 80 FR 60440).]

The Florida bristle fern belongs to family Hymenophyllaceae (referred to as filmy ferns). This subspecies is an inconspicuous, mat-forming fern with root-like structures and bristle-like outgrowths (trichomes). The Florida bristle fern lacks cuticles (the protective layer that covers the outermost layer of cell tissue) and is dependent on elevated moisture conditions because a barrier is not present to prevent unregulated water loss (Kromer and Kessler 2006). The life history of the Florida bristle fern consists of a sporophyte and gametophyte life stage. Mature plants can reproduce sexually through fertilized spores and asexually from root growth. Water or moisture is necessary for fertilization to occur. The extremely dense, filamentous mat formed by individual ferns is called a cluster. Individual plants are too difficult to count separately therefore populations are described by the number of clusters (clumps) of fern.

The Florida bristle fern consists of two disjunct metapopulations about 400 kilometers (249 miles) apart: one in south Florida and the second in central Florida. The south Florida metapopulation consists of four known populations with a total of 10 subpopulations of between 2 and 100 clusters (covering a total area of approximately 10 m²). The central Florida metapopulation has two known populations, no subpopulations, and between 4 to 44 clusters (covering a total area of approximately 5 m²). The subspecies relies on exposed limestone substrate for anchoring and nutrition and a forest hammock habitat with dense cover, moisture, stable ranges of high humidity and temperature, and intact hydrology.

Threats to the subspecies and its habitat include: Development, agriculture, land clearing (removal of limestone boulders), invasive exotic species, and human foot/vehicle traffic resulting in direct destruction or damage to the plants and/or conversion, loss and fragmentation of suitable habitat; changes in temperature, humidity and hydrology (water levels and quality) of stable hammock microclimate caused by edge effects (reduction or loss of surrounding native forest habitat) and climate shifts; and high vulnerability to stochastic events due to low population numbers and limited area of occurrence.

B. CONSERVATION ACTIONS

In 2005, the Service funded the Institute for Regional Conservation (IRC) to facilitate restoration and management of privately owned pine rockland habitats in south Florida, Miami-Dade County (Pine Rockland Initiative). This initiative included prescribed burns, nonnative plant control, light debris removal, hardwood management, reintroduction of pines where needed, and development of management plans. The Pine Rockland Initiative includes 10-year cooperative agreements between participating landowners and the Service/IRC to ensure restored areas will be managed appropriately during that time. The actions to restore and manage the pine rockland habitat will work to protect the existing pine rockland hammocks.

Also in south Florida, Fairchild Tropical Botanic Garden, with the support of various Federal, State, local, and nonprofit organizations, has established the "Connect to Protect Network." The objective of this program is to encourage widespread participation of citizens to create corridors of healthy pine

rockland hammocks by planting stepping stone gardens and rights-of-way with native pine rockland species, and restoring isolated pine rockland fragments. Although these projects may serve as valuable components toward the conservation of pine rockland hammock species and habitat, they are dependent on continual funding, as well as participation from private landowners, both of which may vary through time.

In central Florida, the Withlacoochee State Forest Management Plan (2015) provides program management activities for pine hammock habitats and includes language for minimizing recreational use (foot traffic) within the pine hammocks. Removal of limestone and any plant species is prohibited within the State Forest. Parcels of suitable habitat adjacent to land occupied by the Florida bristle fern are managed by the Southwest Florida Water Management District under the Beville Ranch Conservation Easement.

III. PRELIMINARY RECOVERY STRATEGY

A. RECOVERY PRIORITY NUMBER WITH RATIONALE

The Florida bristle fern is assigned a recovery priority of 6, which indicates a subspecies that faces a high degree of threat and has a low recovery potential. Recovery potential is considered low for the Florida bristle fern because of the following: There are only a few remaining plants distributed in very small geographic areas which make both metapopulations of this subspecies extremely vulnerable to loss from a single stochastic or localized event (low metapopulation resilience). The two limited and disjunct metapopulations offer a low level of subspecies redundancy. Genetic and ecological variability characterize the subspecies ability to adapt to changing environmental conditions (representation). Genetic analysis between the two metapopulations indicates that both metapopulations are from the same subspecies (Hughes 2015). Information collected from data loggers placed in Florida bristle fern hammocks provide evidence that differences in humidity and temperature range tolerances exist between the south and central Florida metapopulations (van der Heiden 2016; Possley and Hazelton 2015). This ecological variability may provide the subspecies some adaptive ability in a changing climate.

The south Florida bristle fern metapopulation occurs in the last remaining and fragmented parcels of pine rockland habitat, with approximately 88 percent of the plant clusters of this metapopulation existing in only one hammock. In central Florida, the few remaining plants in State Forest lands are provided some protection; however, forestry practices, agriculture, removal of limestone substrate, damage from trampling by pigs, invasive exotic vegetation, and recreational foot, and vehicle traffic (including bicycles and airboat landings) place direct pressures on the plants and hammock habitat. The existing suitable substrate and habitats on private lands in central Florida (primarily inholdings in the State Forest), and plants which may exist there, are vulnerable to damage and destruction from these threats. Methods for reintroductions or seeding have not yet been established. Cultivation of the fern in the laboratory has been only partially successful.

RECOVERY STRATEGY

For both metapopulations our initial recovery strategy will be to maintain, protect, and monitor the known populations and their suitable habitat. From the onset, our recovery strategy will include

working closely within our agency, local, state, and private partners to establish management plans for the species. Recovery strategies will be individualized as needed between the south Florida and central Florida metapopulations due to differences in available habitat and conservation actions that occur between these two locations.

B. INITIAL ACTION PLAN

Initial recovery actions for the Florida bristle fern will primarily focus on protection of the existing known populations and their habitat and monitoring of these sites. The Florida bristle fern requires multiple (redundancy), self-sustaining (resiliency) populations distributed across its gradient of genetic and ecological diversity (representation). At this time, we do not fully understand these parameters. Therefore, recovery actions to further define those parameters include:

- Conduct or continue surveys for new populations of the Florida bristle fern.
- Continue to monitor known Florida bristle fern plants and habitat conditions. This includes monitoring a) the health and numbers of populations, b) microhabitat conditions of humidity (moisture), temperature, hydrology, and substrate, and c) surrounding forest vegetation where sinkholes and limestone outcroppings occur (canopy cover, shade and protection).
- Prevent damage and loss of existing hammock habitats (primarily from invasive vegetation); maintain the health and vegetative diversity of mixed wetland tropical hardwood system.
- Conduct or continue research to address a) methods of propagation and reintroduction, and b) spore dispersal and conditions needed for reproduction (such as adequate moisture levels).
- Enhance populations through captive propagation and reintroduction.
- Identify project types and locations that may need special attention (timber; loss of surrounding forest causing edge effect to hammock microclimate).
- Continue to work cooperatively with federal, state, and local government agencies, universities, private landowners, the public, and other recovery partners to restore and protect forested hammock habitat and the Florida bristle fern metapopulations.
- Perform outreach and education on the hammock environment and the Florida bristle fern.

IV. PRE-PLANNING PROCESS

A. PLANNING APPROACH

As part of the Recovery Plan, a Species Status Assessment (SSA; https://www.fws.gov/endangered/improving_ESA/ssa.html) will be prepared for the Florida bristle fern. A SSA begins with a compilation of the best available information on the species (taxonomy, life history, and habitat) and its ecological needs at the individual, population, and/or species levels based on how environmental factors are understood to act on the species and its habitat. Next, a SSA

describes the current condition of the species' habitat and demographics and the probable explanations for past and ongoing changes in abundance and distribution within the species' ecological settings (*i.e.*, areas representative of geographic, genetic, or life history variation across the range of the species). Lastly, a SSA forecasts the species' response to probable future scenarios of environmental conditions and conservation efforts. Overall, a SSA uses the conservation biology principles of resiliency, redundancy, and representation (collectively known as the "3Rs") as a lens to evaluate the current and future condition of the species. As a result, the SSA characterizes a species' ability to sustain populations in the wild over time based on the best scientific understanding of current and future abundance and distribution within the species' ecological settings. A SSA is in essence a biological risk assessment to aid decision makers who must use the best available scientific information to make policy decisions.

The Recovery Plan will include objective and measurable criteria for the Florida bristle fern, which, when met, will ensure the conservation of the species. Recovery criteria will address all meaningful threats to the Florida bristle fern, as well as estimate the time and the cost to achieve recovery. The Florida bristle fern SSA and Recovery Plan will be coordinated by the South Florida Ecological Services Field Office as the lead field office. The draft Recovery Plan should be finalized and sent to the Regional Office for review in 2019, with the final Recovery Plan finalized and sent to the Regional Office for review by 2020. These timelines may be affected by available resources and regional priorities.

B. STAKEHOLDER COMMENT

During the recovery planning process, input, comments and review will be sought from multiple stakeholders within the communities of Miami-Dade County and Sumter County, Florida where this plant occurs. These will include State and Federal agencies, industrial and agricultural groups, research universities, conservation organizations, and private landowners. We will also be working very closely with other botanists and land managers to advance our knowledge and expertise with this species.

Approve: _____


Assistant Regional Director, Region 4

Date: _____

